

Accessing Wheelchair Functions and Assistive Technology Through the Driver Control

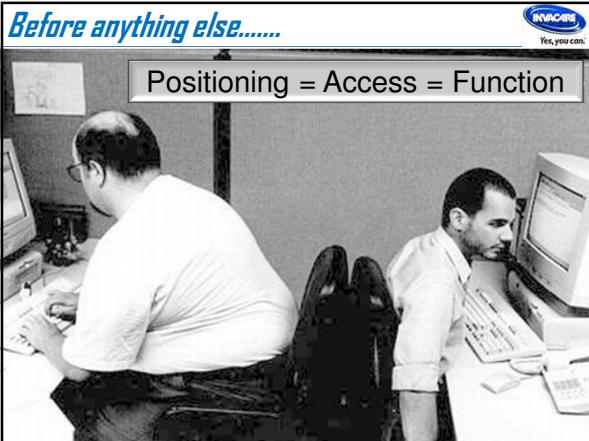
.15 ceu
2012 Invacare CARES
Education Series
Presented by: Joe Schumacher

Objectives

- List the steps involved in programming ECU and other AT through the wheelchair electronics.
- Identify the process by which an individual can change from driving mode to other modes to control communication devices, computers and power seating with a three or four quadrant system.
- State two options to determine what feature the individual is accessing through the power wheelchair electronics.
- State at least 2 methods to customize power seat functions in a 3 quadrant system.

Before anything else.....

Positioning = Access = Function



Clinical Considerations for PMD Electronics



- Independent drive profiles
 - Set differently for environmental demands
- Use of multiple drive control inputs
- Accessing features of the wheelchair using head control
- Importance of auditory feedback

Assigning Modes



How many activities can you place into one Drive Profile???

- Driving
- Power Seating
- Automatic Positioning/ Memory Seating
- Drive Selection: 1, 2, 3, 4, etc.
- Environmental Controls
 - TV, VCR, Stereo, Lights, Intercom, Door Opener, Call for Caregiver...
- Computer Access / Internet Access / E-mail
- Augmentative Communication, i.e., SGD's
- Rim Driving

Accessing Features Through Alternative Controls



- Wheelchair electronics provide access and control of the chair's features and accessories
 - E.g., drive, tilt, recline, communication devices
- Features are accessed through menus via drive control system



Hardware: Interface Modules

INVACARE
Yes, you can.

MKBi Mouse/IR Module



ASL Digital Interface



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Switches

INVACARE
Yes, you can.

Bypassing switches is a Great Feature when required... But... Many just want to "Hit a Switch" & **Gidder Done...**

2 Egg Switches Mounted With Custom Bracket



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Switch Assessment

INVACARE
Yes, you can.

Location...Location...Location...

Sustained v/s Momentary Activation
Pressure (Mechanical) v/s Movement (Electrical)
Quick Release v/s Relaxed Release
Quick Activation v/s Relaxed Activation



Switch Assessment



1. Awareness
2. Active Range of Motion
3. Control / Coordination
4. Muscle Strength
5. Dexterity
6. Muscle Tone
7. Reflexive Patterns / responses

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Switch Assessment



Looking for Repeatable - Controlled - Voluntary - Movements

- isolated
- non-reflexive
- not part of a pattern of movement

Adequate Range of Motion

- Limitations to active range of motion
- Ataxia / SOME movement disorders
 - try switch placement at end ranges

Muscle tone

- **What is the definition of “Normal Muscle Tone”**
- High – Avoid Midline?
- Low – Consider Midline? / Consider Proximal Placement
- Fluctuating Tone – The hardest to address...

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Switch Assessment



Strength

- for adequate movement
- for repeated movement
- for sustained pressure
- Clients with muscle weakness usually do better with midline and proximal placement

Try to avoid placing switch in line of a reflex pattern
 Try Very Hard to avoid placing a switch at the end range of a reflexive pattern. (Release)

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Switch Site Hierarchy



1. Hand
2. Head
3. Mouth
4. Upper Extremity
5. Lower Extremities
6. Foot
7. ???

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Switches Plug into Driver Control



Three Functions Available:

1. Mode Switch
2. Drive Select Switch
3. Actuator Switch

To program a Single function:
Calibrations Menu >Mono Port 1



Dedicated for use with a
 Remote On/Off switch



If Two Functions are required,
 (Two Switches), add "Y" Cable
 (Splitter)

*Calibrations Menu >Mono Port 1
 >Mono Port 2*



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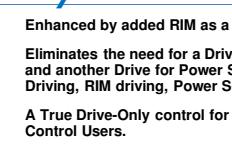
Switch Functions



1. As a Driver Control
2. To change Forward/Reverse (RIM Driving)
3. To change speeds when using "3 Speed Dig"
4. To Operate Powered Seating (Tilt or Recline)
5. As a Safety "Stop" Switch
6. As a Reset Switch to change modes
7. To Turn the Chair On or Off
8. To wake a chair up after it enters "Stand-By Mode"
9. To Change / Access Drive Profiles (Drive Select)

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An image of the Arlenet & ASL Multi-Switch Interface adapter. It is a black rectangular device with five circular ports on the left side, each with a 1/8" phono plug attached. On the right side, there is a DB-9 serial port and a DB-15 VGA port. The device is labeled with the Arlenet logo and the text "ASL Multi-Switch Interface".



Standby Select

• Enhanced by added RIM as a mode.

• Eliminates the need for a Drive for driving only (Regular and RIM) and another Drive for Power Seating. Now each drive can have Driving, RIM driving, Power Seating control, ECU control, etc.

• A True Drive-Only control for all operations. Great for Head Control Users.

“May We Take Your Order”

Scan Mode



- View one drive at a time with enlarged icons
- Active Icon / Mode becomes Enlarged
- Additional Programmed features for that drive shown on Right Side

Enhanced View

Scan Mode

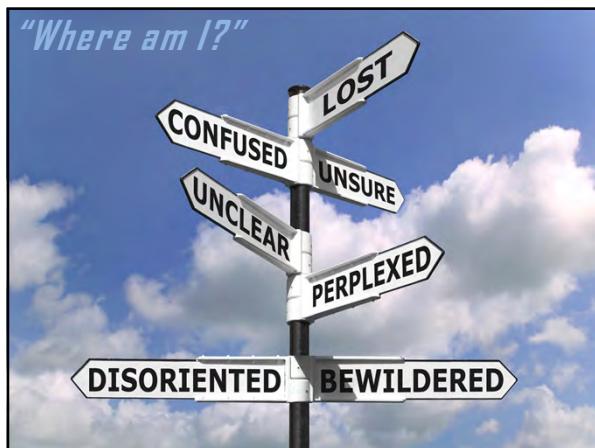


- View one Mode / Icon at a time with enlarged View
- All Icons in Scan Drives appear one at a time
- Scanned Drive appears in upper right for reference
- To turn scanning Off in a drive, Select "OFF" in View/Scan menu option of Performance Adjustments

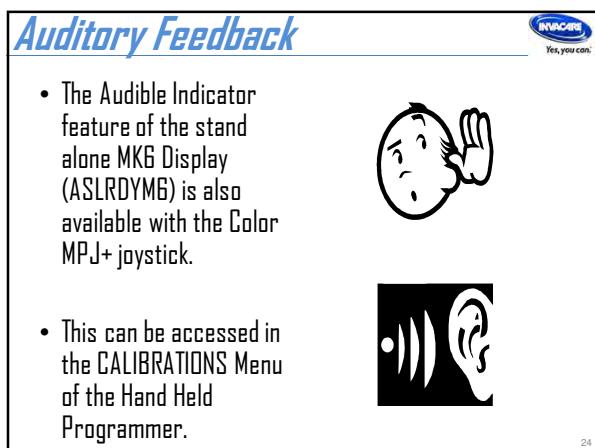
Sequential Scanning

Single Switch Scanner











Who Wants to Be a Millionaire?

What is the least common measurement taken during PMD assessment mat eval?

A. Hip width **B. Lower leg length**
C. Hip R.O.M. **D. Panniculus Grade**

Because I knew you would ask

Panniculus

From Wikipedia, the free encyclopedia

Panniculus is a medical term describing a dense layer of fatty tissue growth, consisting of subcutaneous fat in the lower abdominal area.^[1] It can be a result of obesity and can be mistaken for a tumor or hernia. Abdominal panniculus can be removed during abdominal panniculectomy, a type of abdominoplasty. A panniculus can also be the result of loose tissues after pregnancy or massive weight loss.

Grade of abdominal panniculus

Grade 1: Panniculus barely covers the pubis and mons pubis but not the genitalia.

Grade 2: Extends to cover the genitalia.

Grade 3: Extends to cover the upper thigh.

Grade 4: Extends to cover the mid thigh.

Grade 5: Extends to cover the knee or beyond.^[2]

See also

- Pannus
- Pannicula adiposa
- Pannicula campana

Who Wants to Be a Millionaire?

◆ C. Hip R.O.M.

The hip range of motion is the most often overlooked measurement taken during a mat evaluation for a Power Mobility Device. This measurement or lack thereof is the single greatest contributor to poor positioning within the seating system particularly when the system is not dynamic or the limit angles have not been set.

[Back to Board](#)

Powered Seating Icons

INVACARE
Yes, you can.



-New Icons draw a 2-D Image of the Seat.
-Assigned Actuator is colored in for each quadrant.

<4SW> Actuator Control programming allows user ability to quickly enter ANY actuator mode required

Example shows:
 Forward = Tilt Up/Down
 Reverse = Recline & Legs U/D
 Left = Elevate U/D
 Right = Legs U/D

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Powered Seating Icons

INVACARE
Yes, you can.

Directional Arrows for Powered Seating are either **Red** or **Green**
Green moves into a position for driving
Red moves into a position away from driving
 (No Arrows = Toggles between up/down)



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Powered Seating Choice

INVACARE
Yes, you can.

- <CAPS> gives options for accessing powered seating actuators
- Programmed under <POWERED SEATING> <ACTUATOR CONTROL>

Left / Right Commands cycle between available actuators

In Any Actuator mode:

Forward Command operates actuator toward Upright.

Reverse Command operates actuator Back.

In RIM (3 quadrant) mode, Left Command cycles through Options, Right Command operates actuator in Toggle Mode

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Powered Seating

INVACARE
Yes, you can.

Single Actuator Systems

Non-Expandable Driver Control

Expandable Driver Control

Multiple Actuator Systems

Expandable Driver Control

Only 3 Scenarios for Powered Seating Through Driver Control

REPLACE SPJ+ with SPJ+ w/ ACC (E2310)

Add a Sanode to the System (E2310)

REPLACE 4WSB with 4WSB (Multiple Actuator Interface Box) (E2311)

The Right Box for the Job

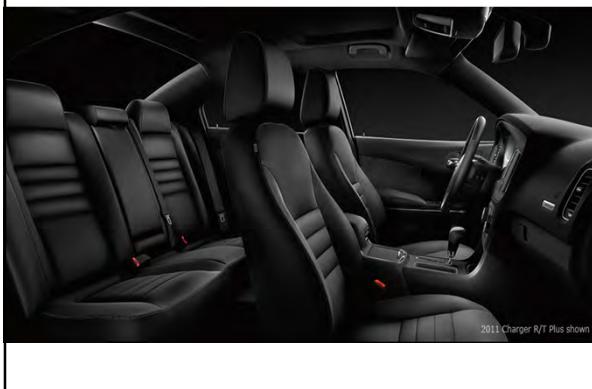
INVACARE
Yes, you can.

4-Way Switch Box

Multiple Actuator Interface Box

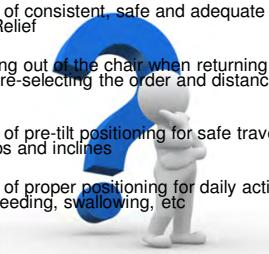
Multiple Actuator Systems

Automatic Positioning/Memory Seating



Automatic Positioning: Applications

- Assurance of consistent, safe and adequate positioning for Pressure Relief
- Inhibit sliding out of the chair when returning to upright sitting by pre-selecting the order and distance actuators move.
- Assurance of pre-tilt positioning for safe travel up and down ramps and inclines
- Assurance of proper positioning for daily activities such as transfers, feeding, swallowing, etc



Infrared Module & Wireless RF Mouse Control

Simplicity is the Key!



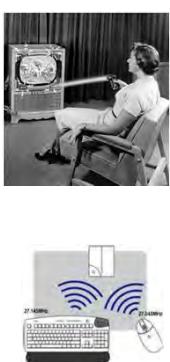
- **Simple operation for the User!**
 - Basic IR Control Functions
 - Supports 4-Quadrant (Joystick) and 3 Quadrant (Head Control users).
 - Head Array users can tilt back and still have access to all IR Features
- **Simple programming set-up for the Provider**
 - No Computer required for set-up / programming
 - Use Remote Programmer (MK5 or MK6i) or Pro SD Card
 - Even Basic SD card will allow IR Set-up
 - Enable IR devices by entering device codes or learn commands
- **Limited to 6 IR devices**
 - Easy access to many important IR devices

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Infrared v/s Radio Frequency



- **Infra-red Signals:**
 - Line of sight Only
 - Can not penetrate walls / obstacles
 - Can be reflected
- **Radio Frequency Signals:**
 - wireless communication protocol
 - Distance limited by strength of signal
 - Penetrate walls / obstacles
 - Different protocols (ZigBee / Bluetooth / Simple / etc)



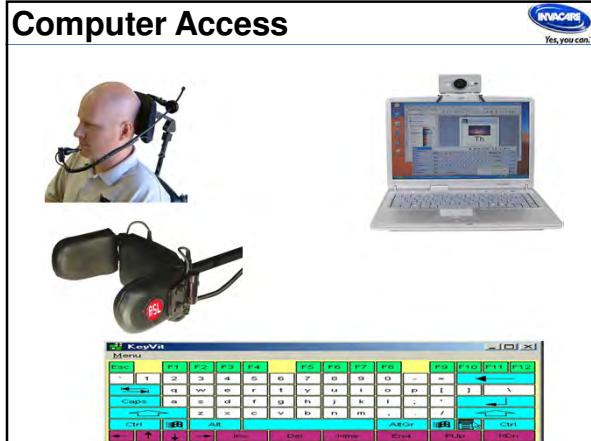
Communication is Paramount!



RF and Bluetooth can interface with SGD-(Speech Generating Device)



Computer Access



Mouse Emulation

The Power Chair gives Independent access to the Environment...

The USB Mouse Gives Independent Access to the Rest of the World...

- Allows the Driver control to act as (emulate) a PC mouse
- Compatible with PC or MAC Computers
- Compatible with Augmentative Communication Devices (AAC)
- Included Standard with the IR Module
- Use with On Screen Keyboard for Access



Mouse Clicks

MK6i-

- Dedicated External switches
- Dedicated Driver Control Commands



B-net-

– left and right directional switches, quick hit

Q-Logic:

- left directional switch = left click, double hit = double click
- Right directional switch = right click
- External switch via additional "Run Plug"

How does Mouse Emulation work?

- Plug in the Dongle to the USB Port
 - Looks like a simple Flash Drive
- Program “Mouse On” in <Performance Adjustment> Menu
 - Choose 3 quadrant for RIM drivers
 - Choose 4 quadrant for Joystick drivers
- To operate mouse w/ the driver control, simply choose the Mouse Icon on the Display



The Driver Control will now move the cursor



Mouse Emulation 4-Quadrant Mode

- Proportional Joystick will move the mouse in any direction.
- Mouse Click can be done using:
 - Stereo switch - Left & Right click function
 - Mono Switch – Left click only
 - Dwell “Software” installed on PC (users with no switch access)



Mouse Emulation 3-Quadrant Mode

Drivers using RIM (3 quadrant) driving

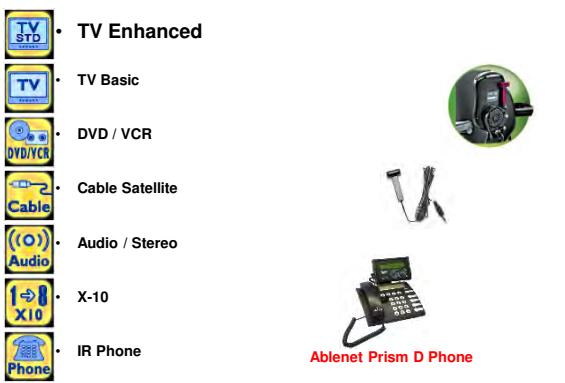
- Right Command = Cursor movement toggles: Left / Right
- Forward Command = Cursor movement toggles: Up / Down
- Left Command = Mouse click / Double Click / Mouse Latch
 - (Mouse Latch = pressing & holding left mouse button)



Infrared Module AND RF Mouse Emulation



Access!



X-10 Control



Environment: X-10 Control

- On/off
- Lights and Appliances
- Thermostats
- Electric beds
- Door Openers...
- MK6i and Q-logic only send IR for X-10 so an X-10/IR converter is required in addition to modules
- www.smarthome.com #4040, \$30.00



IR Operation

Drivers using 4 quadrant mode

- **Right Command:** Scrolls right through menu options
- **Left Command:** Scrolls left through menu options
- **Forward Command:** Selects icon / feature



IR Operation

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IR Operation

- Drivers using RIM (3 quadrant) driving
 - Right Command:** Scrolls right through menu options
 - Left Command:** Selects icon / feature
 - Forward Command:** Does Nothing. Allows use as a head rest

Allows users to remain tilted & change the channel, answer the phone, etc...



Hardware: SD (memory) Cards

Basic



- Comes with **EVERY** chair w/ Rehab Driver Controls.
- Use to back up / Restore **only One System**
- Leave behind with user or store in providers files



Professional

- Provides benefits of LapTop IVS – AND MORE – In the Palm of Your Hand!
- Diagnostics / Help Screens / Trouble-Shooting Tips
- Create Libraries of Ready to Install Custom Programs
- Download software upgrades from www.invacare.com
- Install software upgrades on chairs

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